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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/524,270 | 02/11/2005 | Yasushi Itoh | 50395-315 | 4103 |

20277 7590 06/04/2009

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| EXAMINER | |
|---|---|
| MILLER, DANIEL H | |
| ART UNIT | PAPER NUMBER |
| 1794 | |
| MAIL DATE | DELIVERY MODE |
| 06/04/2009 | PAPER |

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex parte* YASUSHI ITOH, SADAMU ISHIDU,
and YASUSHI TSUZUKI

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Appeal 2009-000872
Application 10/524,270
Technology Center 1700

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Decided:[1] June 4, 2009

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Before ADRIENE LEPIANE HANLON, CHUNG K. PAK, and TERRY J. OWENS, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

## DECISION ON APPEAL

## STATEMENT OF THE CASE

The Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1 and 23-28. Claims 29-33, which are all of the other pending claims, stand withdrawn from consideration by the Examiner. We have jurisdiction under 35 U.S.C. § 6(b).

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

*The Invention*

The Appellants claim a sintered aluminum nitride body. Claim 1 is illustrative:

1. An aluminum nitride sintered body having a maximum length of 320 mm or more, a thickness of more than 0 mm and 2 mm or less, a warpage of 0 μm/mm or more and less than 1 μm/mm, and a local waviness height of 0 μm or more and 50 μm or less after a sintering step is finished.

*The Reference*

| | | |
|---|---|---|
| Natsuhara | 5,732,318 | Mar. 24, 1998 |

*The Rejection*

Claims 1 and 23-28 stand rejected under 35 U.S.C. § 103 over Natsuhara.

OPINION

We reverse the Examiner's rejection.

*Issue*

Have the Appellants shown reversible error in the Examiner's determination that Natsuhara would have rendered prima facie obvious, to one of ordinary skill in the art, a sintered aluminum nitride body having a warpage of 0 μm/mm to less than 1 μm/mm, and a waviness height of 0 μm to 50 μm?

*Findings of Fact*

Natsuhara discloses a sintered aluminum nitride body which has a preferred thickness of 0.4 to 0.6 mm and, in Example 2, is cut to a length of 300 mm (col. 5, ll. 14-15, 21-23; col. 17, l. 38). The warpage and waviness preferably are not more than 2.0 mm and, in Example 1, are not more than

1 mm (which, for the 300 mm length in Example 1 (col. 12, l. 58), corresponds to a warpage of 3.3 μm/mm) (col. 9, ll. 35-36; col. 17, ll. 5-6).

*Analysis*

The Examiner argues that Natsuhara "teaches a warpage of not more than 2.0 mm (column 9 line[s] 35-50), which is considered to encompass applicant's claimed range" (Ans. 4), and that Natsuhara is silent as to "the waviness claimed by applicant." *Id.* Thus, although Natsuhara discloses a preferred waviness range of not more than 2.0 mm (col. 9, ll. 35-36), the Examiner considers Natsuhara to be silent as to the local waviness height recited in the Appellants' claims. The Examiner argues that "because of the similarity of the claimed composition, conductance,[2] and warpage[,] the waviness would inherently be substantially similar" (Ans. 8).

The Appellants argue that their warpage and waviness are controlled by using a drying time before sintering of at least 10 hours, and a 20% to 60% closed space volume ratio (Br. 7-8).

Regarding the drying time and the closed space volume ratio, the Appellants' Specification discloses (Spec. 10:9 – 11:18):

> "[A] drying step of naturally drying the molded body for 10 hour[s] or more is performed, followed by a step of removing the binder from the dried molded body. Afterward, a sintering step is performed so that the molded body free of the binder is sintered. The natural drying is performed more preferably for 10 hours or more, and most preferably for 20 hours or more.
>
> By performing the above procedure, because the drying step is conducted between the step of producing the molded body and the step of removing the binder (the binder removing step), a solvent,

[2] The thermal conductivities of the sintered aluminum nitride bodies of Natsuhara and the Appellants are, respectively, at least 50 W/mK (col. 6, ll. 27-30), and 85 to 105 W/mK (Spec. 20:16-18; Claim 25).

> moisture, etc. slowly and sufficiently volatilize out of the whole molded body by the drying step. Thus, the molded body contracts almost uniformly over the entire portion thereof as a result of volatilization of the solvent and moisture. As a result, the generation of distortion and internal stress caused by the volatilization of the solvent and moisture can be controlled. Accordingly, during the binder removing step and the sintering step as post-steps, it is possible to prevent deformation such as warpage or waviness in the molded body or the sintered body.
>
> . . .
>
> With respect to the method of producing the aluminum sintered body according to the fifth aspect of the present invention, the sintering step comprises sintering the molded body under a condition that the molded body is arranged in the space surrounded by the jig comprising boron nitride as the major component. Preferably, the ratio of the volume of the molded body before sintering to the volume of the space surrounded by the above jig ranges from 10% to 70%, more preferably from 20% to 60%.
>
> In this case, since the molded body is sintered in a state of being arranged within the space surrounded (substantially closed) by the jig, it is possible to reduce a risk of generating a local flow of atmospheric gas near the molded body during the sintering step. Thus, the risk of adverse effects on the shape of the molded body (the sintered body) caused depending on the condition of the atmospheric gas can be reduced.

An inherent characteristic must be inevitable, and not merely a possibility or probability. *See In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981).

Natsuhara's disclosed method for making the aluminum nitride sintered body includes steps of degreasing at 600-900°C and sintering at 1700-1900°C (col. 13, ll. 13-33). The Examiner has not established that Natsuhara discloses the Appellants' natural drying or closed space volume, or explained why, absent the natural drying or closed space volume, a

sintered aluminum body having warpage as low as required by the Appellants' claims inevitably would be obtained. Although, as pointed out by the Examiner (Ans. 7), Natsuhara's preferred 2.0 mm or less warpage range (6.7 µm/mm for a 300 mm length) (col. 9, ll. 35-36) encompasses the Appellants' recited range of 0 to less than 1 µm/mm, the Examiner has not established that a warpage as low as that recited by the Appellants is obtainable without the Appellants' natural drying or closed space volume. Thus, even if, as implied by the Examiner, local waviness height is proportional to warpage, because the Examiner has not established that Natsuhara's warpage is inevitably similar to that of the Appellants, the Examiner does not have a sound basis for arguing that Natsuhara's local waviness height is similar to that of the Appellants.

Nor has the Examiner established that one of ordinary skill in the art would have been led by Natsuhara, through no more than ordinary creativity, to modify Natsuhara so as to produce a sintered aluminum nitride body having the low warpage and waviness required by the Appellants' claims. *See KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (In making an obviousness determination one "can take account of the inferences and creative steps that a person of ordinary skill in the art would employ").

*Conclusion of Law*

The Appellants have shown reversible error in the Examiner's determination that Natsuhara would have rendered prima facie obvious, to one of ordinary skill in the art, a sintered aluminum nitride body having a warpage of 0 µm/mm to less than 1 µm/mm, and a waviness height of 0 µm to 50 µm.

DECISION/ORDER

The rejection of claims 1 and 23-28 under 35 U.S.C. § 103 over Natsuhara is reversed.

It is ordered that the Examiner's decision is reversed.

REVERSED

PL Initial:
sld

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